Supplemental Manual to the Ecology Stormwater Management Manual for Western Washington

Volume V Runoff Treatment BMPs

City of Auburn Community Development and Public Works Departments

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Chapter 1 – Introduction

1.1 Purpose of this Volume

Volume V of the City of Auburn (COA) Supplemental Manual to the Department of Ecology's (Ecology) Stormwater Management Manual for Western Washington (SWMMWW) provides additional guidance for selection and design of stormwater treatment facilities for new development and redevelopment projects to comply with Minimum Requirement #6 – Runoff Treatment, and the design of On-Site Stormwater Management BMPs to comply with Minimum Requirement #5 – On-Site Stormwater Management.

The Ecology SWMMWW is available online at the link below:

2014 SWMMWW

1.2 Content and Organization of this Volume

The COA Supplemental Manual Volume V is organized to correspond to the SWMMWW Volume V. This Volume should be used in conjunction with the SWMMWW to design stormwater treatment and on-site stormwater management facilities for installation within the City of Auburn.

Important additions and changes contained in the COA Supplemental Manual for this Volume include:

- **Chapter 4: General Requirements for Stormwater Facilities** gives additional general requirements for facilities in the City of Auburn.
    - **Section 4.3.1** provides setback requirements for stormwater facilities.
- **Chapter 5: On-Site Stormwater Management**
    - **Section 5.3.1** defines the City requirements for meeting BMP T5.13 Post-Construction Soil Quality and Depth and provides additional design criteria for BMP T5.15 Permeable Pavements.
- **Chapter 7: Infiltration and Bioretention Treatment Facilities**
    - **Section 7.2** provides additional site analysis requirements for infiltration and bioretention facilities.
    - **Section 7.4** provides additional design criteria for BMP T7.30 Bioretention Cells, Swales, and Planter Boxes.

Omitted Sections

Several chapters and sections in Volume V of the SWMMWW do not require any additional clarification in the COA Supplemental Manual. Refer to the SWMMWW for the following chapters and sections:

- **Chapter 1: Introduction**
    - **Sections 1.3 and 1.4 (all subsections)**
- **Chapter 2: Treatment Facility Selection Process**

    - **Section 2.1 and 2.2 (all subsections)**
- **Chapter 3: Treatment Facility Menus (all sections)**
- **Chapter 4: General Requirements for Stormwater Facilities**
    - **Sections 4.1 and 4.2 (all subsections)**
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- **Chapter 5: On-Site Stormwater Management**
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Chapter 4 – General Requirements for Stormwater Facilities

Additional Requirements for the City of Auburn

Refer to Appendix K Stormwater Facility Access Requirements, Volume I of the COA Supplemental Manual for storm facility access criteria.

- Stormwater runoff treatment systems utilized in the public right of way shall comply with all other relevant design standards including requirements for street tree clearance and height. Systems that, in the opinion of the City Engineer, do not have adequate settling/debris separation chambers/basins, may conflict with existing or future utilities, or do not have acceptable maintenance requirements shall not be allowed.

- All storm facility landscape planting and seeding plans shall be prepared and sealed by a Washington State licensed professional Landscape Architect or similar specialist approved by the City of Auburn.

- Water quality systems shall be designed for simplicity and ease of maintenance.

- With approval from the City Engineer, stormwater runoff from required improvements in the public right-of-way may be designed to discharge onto the private property and be mitigated within the on-site storm drainage system with pretreatment of the runoff from the public right

of way. In this case, the applicant would be required to enter into a Stormwater Easement and Maintenance Agreement (SWEMA) holding the City harmless for the connection, and the applicant shall agree to maintain the system. The SWEMA would be per the City's template document without revisions that would place additional liability or responsibility upon the City.

4.3 Setbacks, Slopes, and Embankments

4.3.1 Setbacks

Additional Requirements for the City of Auburn

Project proponents should consult the Auburn City Codes to determine all applicable setback requirements. Where a conflict between setbacks occurs, the City shall require compliance with the most stringent of the setback requirements from the various codes/regulations. Auburn City Code titles and chapters that are relevant to setback requirements are as follows:

- **Chapter 13.16 Fire Hydrants** – Requirements related to fire hydrant visibility
- **Title 15 Buildings and Construction** – Requirements meeting building and fire regulations
- **Chapter 16.10 Critical Areas** – Requirements for wetland, stream, wildlife habitat area, and geologic hazard area buffer setbacks
- **Title 18 Zoning** – Requirements for lot line setbacks in all zoning classifications

Required setbacks for storm facilities are as follows:

- Minimum spacing between trenches shall be 4 feet measured from the edge of trench.
- All systems shall be at least 10 feet from any structure. If necessary, setbacks shall be increased from the minimum 10 feet in order to maintain a 1:1 side slope for future excavation and maintenance.
- All systems shall be placed at least 5 feet from any property line. If necessary, setbacks shall be increased from the minimum 5 feet in order to maintain a 1:1 side slope for future excavation and maintenance.
- All facilities shall be setback from sensitive areas, steep slopes, landslide hazard areas, and erosion hazard areas as governed by the Auburn City Code. Runoff discharged near landslide hazard areas must be evaluated by a geotechnical engineer or qualified geologist. The discharge point shall not be placed on or above slopes greater than 15% or above erosion hazard areas without evaluation by a geotechnical engineer or qualified geologist and City approval.
- For sites with septic systems, all infiltration systems, unlined wetponds and detention ponds shall be downgradient of the drainfield unless the site topography clearly prohibits subsurface flows from intersecting the drainfield.

Additional setbacks for specific stormwater facilities will be noted in the appropriate section.

Chapter 5 – On-Site Stormwater Management

5.3 Best Management Practices for On-Site Stormwater Management

5.3.1 On-Site Stormwater Management BMPs

BMP T5.13 Post-Construction Soil Quality and Depth (Amended)

Additional Requirements for the City of Auburn

The City of Auburn requires using the guidelines and procedures found in *Guidelines and Resources For Implementing Soil Quality and Depth BMP T5.13 in WDOE Stormwater Management Manual for Western Washington* when implementing BMP T5.13. This document is available at:

http://www.soilsforsalmon.org/pdf/Soil_BMP_Manual.pdf

BMP T5.15 Permeable Pavements (Amended)

Additional Requirements for the City of Auburn

Permeable pavements installed within the City of Auburn, including porous asphalt, pervious concrete, and permeable pavers, shall comply with the City of Auburn Engineering Design and Construction Standards, including the following additional Design Criteria:

- All permeable pavements, including subgrade, base materials, and surface treatments, shall conform to the City of Auburn Engineering Design and Construction Standards.
- Permeable pavements shall have a minimum separation of 1 foot from the bottom of the lowest gravel base layer and/or treatment layer to the Seasonal High Groundwater Elevation, bedrock, or other low permeability layer as determined by a geologist or engineer licensed in the State of Washington.
- Geosynthetic fabrics shall be installed between the subgrade and base layer for soil separation and stabilization. Geosynthetic fabrics used with permeable pavements shall meet the specifications defined in the City of Auburn Engineering Construction Standards.
- Permeable pavement road designs shall include conventional stormwater conveyance design with sufficient capacity per Volume III, Appendix D of the COA Supplemental Manual, and the City's Engineering Design and Construction Standards. The purpose of including conventional stormwater conveyance systems with permeable pavement designs is to provide adequate drainage capacity for storm events that exceed the capacity of the permeable pavement.
- Underdrain systems for permeable pavement surfaces are subject to approval of the City Engineer or his/her designee.
- Acceptance and/or infiltration testing for all permeable pavement surfaces shall be performed per the City of Auburn Engineering Construction Standards.

- Permeable pavements shall not be allowed for roadways with over 400 ADT and greater than very low truck traffic. Very low truck traffic shall be 2% or less of the total ADT for the roadway and includes vehicles with a FHWA Vehicle Classification of 4 or 5. Permeable pavements shall not be allowed on any roadway with vehicle(s) with a FHWA Vehicle Classification of greater than 5.
- The adjusted native soil infiltration rate beneath all proposed permeable pavements shall be a minimum of 0.1 inches/hour for public facilities. The adjusted infiltration rate is determined by applying appropriate correction factors the measured saturated hydraulic conductivity per Volume III, Chapter 3.4 of the SWMMWW.
- The entire surface of all permeable pavements shall be accessible by maintenance equipment.
- To avoid clogging permeable pavements, pervious areas such as lawn and landscape areas shall not drain to permeable pavements.
- The drainage of additional impervious area to permeable pavements located on private property shall not exceed a maximum ratio of 1:1. Downspout outlets or ground level impervious surfaces shall not drain more than 1,000 sq. ft. to a single point on the permeable pavement.
- Permeable pavements located within the public right-of-way shall not receive drainage from surfaces located on private property.
- All permeable pavement located in the public right of way shall be constructed of porous asphalt or pervious concrete. Permeable pavers and plastic or concrete grid systems shall not be used in the public right of way.
- Permeable pavement designs shall demonstrate compliance with the Site Suitability Criteria for Permeable Pavement found in Volume III, Chapter 3.4 of the SWMMWW.
- The following maximum longitudinal slopes shall apply to permeable pavements:
    - Porous Asphalt – 5% maximum slope
    - Pervious Concrete – 10% maximum slope
    - Permeable pavers – 12% maximum slope

  Permeable pavements with a longitudinal slope greater than 3% shall incorporate check dams into the subgrade design to reduce subsurface flow rates. Permeable pavements with a longitudinal slope greater than 5% shall incorporate terraced subgrades and baffles to reduce uneven ponding.

- Permeable pavements shall not be allowed in the following areas:
    - At sites defined as “high use” per Appendix G, Volume I of the SWMMWW.
    - In areas with “industrial activity” as identified in 40 CFR 122.26(b)(14).
    - At sites where the risk of concentrated pollutant spills is higher than average, including but not limited to gas stations, truck stops, and industrial chemical storage sites.
    - Where routine, heavy applications of sand occur in frequent snow zones to maintain traction during weeks of snow and ice accumulation.
    - In areas of required pavement design elements where the material properties of permeable pavements present significant constructability issues as determined by the

City Engineer, including but not limited to ADA ramps, driveway aprons, and curb transitions.
    - Within 50 ft of or on slopes greater than 20%.
    - Within 10 ft of any known underground storage tank and connecting underground pipes, regardless of tank size.
- Permeable pavement located on sites within the City of Auburn Groundwater Protection Zones 1 & 2 requires approval by the City Engineer. Permeable pavements within these Zones shall incorporate advanced treatment.
- If the proposed permeable pavement is considered a pollution-generating surface and is located within the public right-of-way, the subgrade shall meet all of the following criteria to a depth of one foot below the lowest gravel base layer:
    - Cation Exchange Capacity is greater than 5%
    - Organic Content is greater than 1%
    - Measured (initial) saturated hydraulic conductivity is less than 9 in./hr.
    - Depth of infiltration treatment layer is equal to or greater than 18 inches.

Chapter 7 – Infiltration and Bioretention Treatment Facilities

7.2 General Considerations

Additional Requirements for the City of Auburn

Perform a site suitability analysis per Section 3.3.7, Volume III of the SWMMWW for all infiltration and bioretention facilities. Due to Seasonal High Groundwater, Groundwater Protection Zones, and other site conditions, the City of Auburn restricts the use of infiltration in certain areas. Refer to Appendix I, Volume I of the COA Supplemental Manual for more information on infiltration infeasibility when selecting the List Option to meet Minimum Requirement #5 On-Site Stormwater Management.

7.4 Best Management Practices (BMPs) for Infiltration and Bioretention Treatment

BMP T7.30 Bioretention Cells, Swales, and Planter Boxes (Amended)

Additional Requirements for the City of Auburn

Design Criteria:

- All bioretention facilities receiving stormwater exclusively from private sources shall be located on private property and privately maintained per the approved Operations and Maintenance manual for the facility.
- Bioretention facility designs shall be prepared by a professional engineer licensed in the State of Washington. Bioretention facility designs shall be clearly labeled and include the following components:

- Ponding Zone: From the top of the Bioretention Soil Media to the overflow elevation provide a minimum 6 inch to maximum 12 inch ponding zone.
- Overflow: A piped or overland overflow structure is required. The overflow shall discharge to the public system per the City of Auburn Engineering Standards. A piped overflow is required when the underlying native soil has a measured infiltration rate below 0.25 inches per hour. Overland overflow paths shall be stabilized with streambed cobble per WSDOT 9-03.11(2) and direct to an approve downstream drainage area. The inlet elevation shall allow for a minimum of 6 inches freeboard.
- Inlet: The inlet shall be designed and constructed with the appropriate slope and elevation to allow for the free flow of stormwater into the facility The facility inlet shall include a 6 inch thick layer washed drain rock or streambed cobble per WSDOT 9-03.11(2) (2 to 4 inch minimum) pad to transition from inlet or splash pad to Bioretention Soil Media to dissipate energy and/or disperse flow. The energy dispersion pad shall have a minimum width equal to the inlet width.
- Dimensions: Provide a flat bottom with a minimum width of 1 foot. Side slopes of bioretention facilities shall be a maximum 2.5:1 adjacent to sidewalks, maximum 4:1 at sheet flow inlets, and maximum 3:1 in all other locations.

- Public bioretention planter boxes require prior approval from the City Engineer.
- Public bioretention cells and swales shall be sodded or seeded using the seed mixtures in *Table 7.4- 1 Grass Seed Mixes for Public Bioretention Facilities* below.

Grass Seed Mixes for Public Bioretention Facilities			
Moisture Condition By Weight	**Species**	**Common Name**	**Percent**
Very Moist	Agrosotis tenuis	Colonial Bentgrass	50
	Festuca ruba	Red Fescue	10
	Alopocuris pratensis	Meadow Foxtail	40
Moist	Festuca arundinacea	Meadow Fescue	70
	Agrosotis tenuis	Colonial Bentgrass	15
	Alopecurus pratensis	Meadow Foxtail	10
	TrifoliZum hybridum	White Clover	5
Moist-Dry	Agrosotis tenuis	Colonial Bentgrass	10
	Festuca ruba	Red Fescue	40
	Lolium multiflorum	Annual Ryegrass	40
	Trifolium repens	White Clover	10
Application rates: Hydroseed @ 60 lbs/acre Handseed @ 2 lbs/1000 square feet			

Table 7.4- 1 Grass Seed Mixes for Public Bioretention Facilities

Chapter 12 – Emerging Technologies (all sections)

Additional Requirements for the City of Auburn

All emerging technologies that have received General Use Level Designation (GULD) may be considered for use on private projects. Currently, the only proprietary technologies approved for public treatment are the Modular Wetland without vegetation and the BioPod without vegetation.